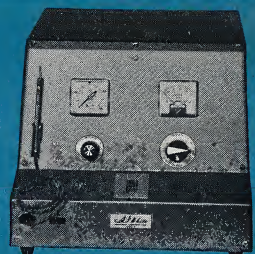
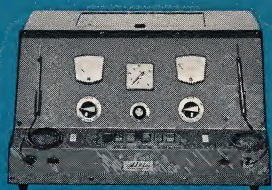


germanium / glass / silicon / oxide coatings / ceramics / fragile crystals / feather burrs / mica / tungsten /
plastics deflashing / ferrite / resistor adjusting / surface deposits / and other fragile, hard-to-cut materials

The
S. S. White
Industrial
Airbrasive®
Unit



cool, shockless,
precise way to
cut...abrade...deburr...clean
hard, brittle materials



BULLETIN 6407A



S.S. WHITE COMPANY Industrial Division
201 East 42nd Street / New York, New York 10017

THE **S.S. WHITE** INDUSTRIAL AIRBRASIVE UNIT

The unique cutting tool
that successfully performs jobs
previously thought impossible!

Industrial Airbrasive

Units are light-weight and portable. (For complete description, see pages 10 and 11.) The Model G Twin-Jet Unit, shown here, is complete and ready to attach to 110 volt circuit and propellant gas supply. The two handpieces shown may be used manually or in fixtures. Two foot switches control the operation of the tools.



Manual operation.

For many deburring, finishing, cleaning and cutting operations, the Airbrasive Unit is used manually. Operator has complete freedom of control and can often reach places inaccessible to ordinary tools.

Cool, shockless cutting . . . The secret of the S. S. White Industrial Airbrasive is a controlled, high-speed stream of abrasive particles that quickly slices or abrades, as needed, hard brittle materials.

Gas-propelled to supersonic speeds through a small, precise nozzle, the finely graded abrasive particles produce a cool, shockless cutting action. There is no contact between the tool and the work. What little heat produced is immediately removed by the propellant gas. A high order of accuracy is possible because the Airbrasive stream is precisely controlled.

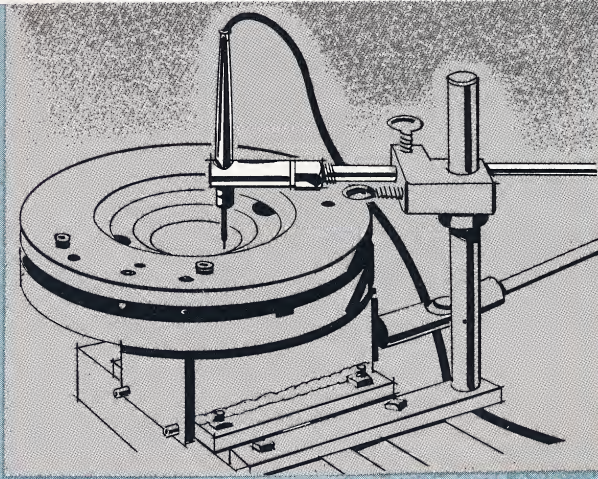
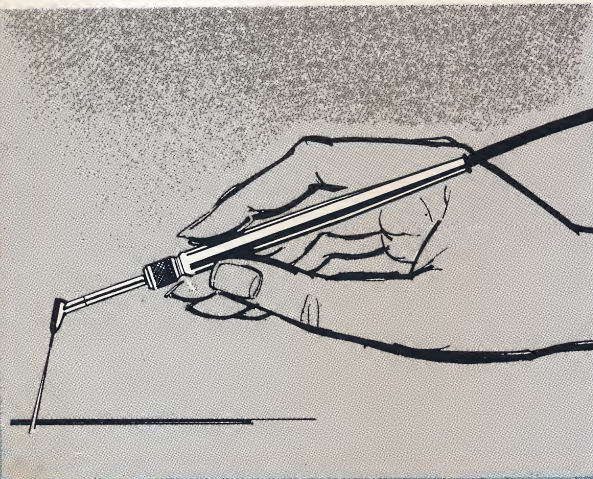
. . . of hard brittle materials. In both the laboratory and on automation lines, the Industrial Airbrasive Unit is doing hundreds of jobs that were previously thought impossible. A wide variety of hard materials are being cut or shaped . . . deburred . . . cleaned . . . abraded.

It is successfully performing these delicate operations on glass, mica, glass, fragile crystals, ceramics and others that are likely to shatter with the application of ordinary contact tools.

Description and Application

Everyday new and different uses are being found for the Airbrasive process . . . cutting and cleaning semiconductor materials . . . adjusting micromodule elements . . . contact paths on potentiometers . . . printed circuits . . . cleaning metallic smears from ceramics . . . deburring precision parts . . . to name *just a few*.

This brochure was designed to give you some idea of the amazing capabilities of the Airbrasive. If it appears that the Airbrasive could solve your problems, describe them on the handy form enclosed with this brochure and mail it with a few samples to S. S. White Industrial Division. *We will make tests at no cost to you.*



Automatic operations.
The Airbrasive is widely used in automatic cutting, abrading and deburring operations where the cutting nozzle is held in a fixture. The fixture or the workpiece can be operated by drives, cams, pantographs and other mechanisms. Highest precision is obtainable, because of the highly accurate flow of Airbrasive Powder.

- **Cool cutting action** . . . Because it cuts so differently from ordinary tools, the Airbrasive Unit cannot cause heat damage to the most delicate of materials. This one fact alone has opened up a whole new range of operations.
- **Shockless** . . . The Airbrasive nozzle never touches the work . . . no chatter, no vibration, no pressure. Makes it possible to cut fragile materials with complete safety and freedom from breakage. In many cases it has practically eliminated production losses.

any exceedingly hard materials
cutting methods, tool wear is
In these cases the

... Airbrasive is highly accurate,
cause particles is precisely
controlled. And, unlike ordinary tools, no

variations are caused by tool wear and surface irregularities in the work.

- **Flexible** . . . The Airbrasive is equally at home in the laboratory or on an automated production line. Handpieces and nozzle tip holders can be rigged in fixtures. A wide range of cuts can be made . . . the same tool can cut a line as fine as .005" or abrade an area as large as several square inches. The Airbrasive Unit can often reach places that are inaccessible to ordinary cutting tools.
- **Low in cost** . . . The Airbrasive Unit, with all its advantages, is available to you at relatively little cost. It is economical in operation too.
- **Compact and portable** . . . detachable connections, compact size make the Airbrasive easy to shift from location to location.

A WIDE RANGE OF APPLICATIONS

*(with new ones
being found
every day!)*

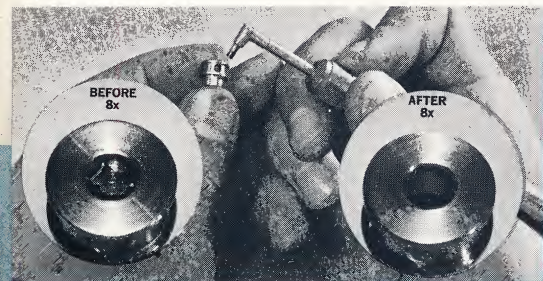
cutting and shaping of fragile crystals, germanium, silicon, ceramics and others

abrading and adjusting resistors in printed circuits

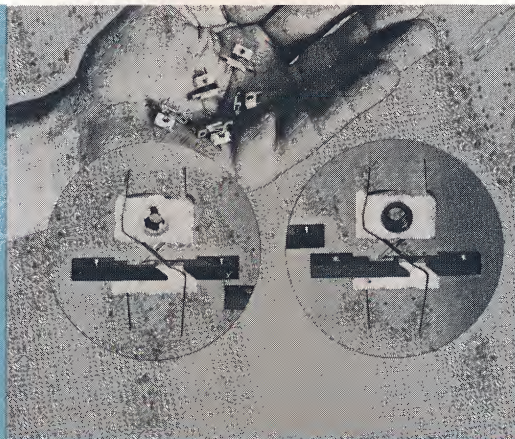
removing potting materials from electrical leads

stripping varnish from potentiometer windings

deburring of small, precision parts



△ **Deburring.** Removal of tiny, hard-to-get-at burrs is faster and more thorough with the Airbrasive than with hand methods. For example, the manufacturer of the small missile part above was able to cut deburring time by 80%. No other way—including slurries, scraping, electro-polishing — was able to remove the burrs formed at the intersections of the $\frac{3}{32}$ " holes as efficiently as the Airbrasive.



△ **Ceramic flash, and metal burrs were cleaned** from these precision missile parts by Airbrasive. The new method raised production from 16 parts per person per day to 300 parts . . . with fewer rejects! This was the experience of Molecular Dielectrics, Inc., Clifton, N. J.

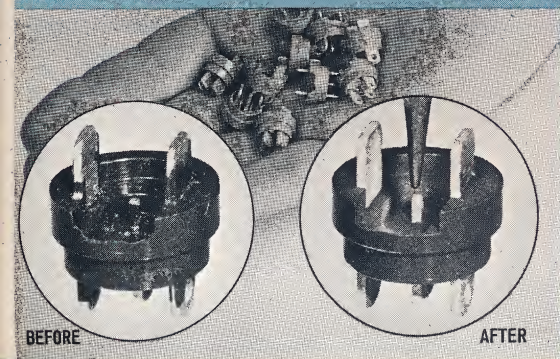


△ Cutting tungsten sheet

0.005" thick at Comstock & Wescott, Inc. Research and Development Engineers, Cambridge, Massachusetts. This company reports, "The Airbrasive method was found to be the only way to cut tungsten without danger of cracking, splitting, or breaking the piece."

▽ **Deflashing** by Airbrasive reduced the cost of this product by 60%. It enabled fewer people to clean these tiny switch bases in fewer hours. It reduced rejects from 300% to nil. Use the Airbrasive to remove plastic flashing, ceramic spatter, paint, oxides, and other unwanted coatings. Especially good at cleaning tiny, inaccessible nooks and crannies.

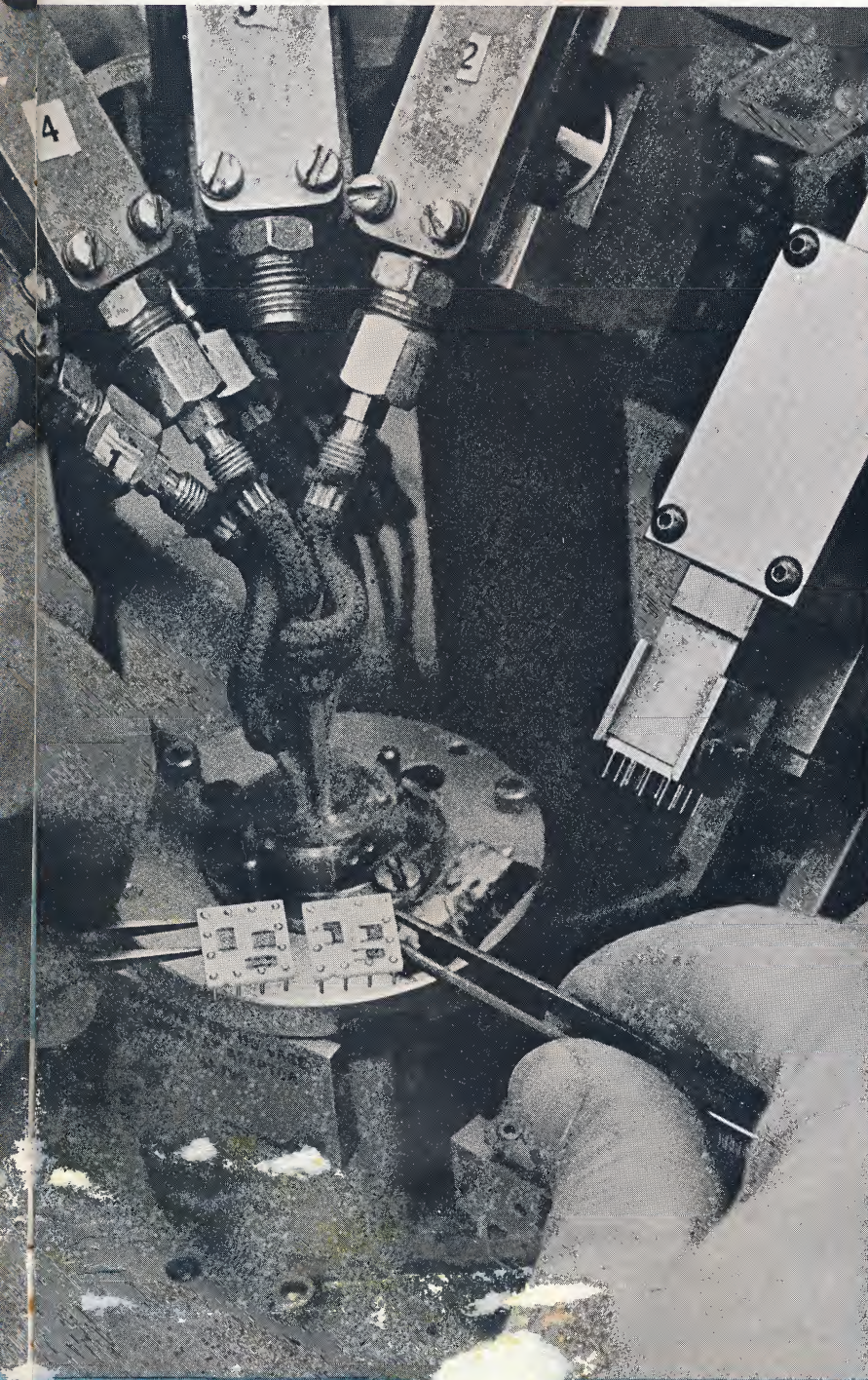
Laminated optical filter discs are cut to tolerances of 0.020" by Pacific Metaplate Co., without delamination or chipping, without change of wavelength. Airbrasive cutting action is so gentle and controlled that company has never had a reject. Discs as small as $\frac{1}{16}$ " dia.; discs up to $\frac{1}{4}$ " thick have been successfully cut. Filters **can** **be** in research, medicine.



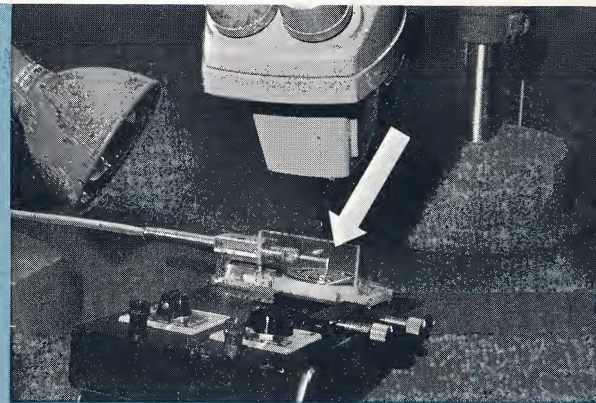
cleaning metallic smears from ceramics, removing oxides.
drilling holes in thin, fragile sections
scribing lines on coated ceramic resistors
calibrating glassware
marking, coding, numbering, engraving
matte finishing metals, frosting glass
testing abrasion resistance of surfaces
and many, many others!

S. S. WHITE

Applications



△ **Resistor trimming** — Shockless Airbrasive unit trims resistors on a 360 are being square and its. The Airbrasive stream specified elec- per second.



△ **Micromodule elements.** The Airbrasive process is used to adjust terminations and component values on microelement wafers. To perform cutting operations on wafer terminations and abrading operations on microelement resistors and capacitors, the 0.310 inch-square wafers are held in a movable fixture and manipulated under the nozzle of the Airbrasive cutting tool.



△ **Cutting shallow inclines 0.0002" and 0.0004" deep in alloy steel,** self-acting gas lubricated thrust bearings at Eclipse-Pioneer Div. of Bendix Aviation Corp. The Airbrasive Unit has effected tremendous time savings. Parts were previously hand-lapped and took approximately eight hours. According to Eclipse-Pioneer, "...The Airbrasive Unit does a better job and takes approximately **fifteen minutes!**"



DESIGNED FOR BOTH MANUAL AND AUTOMATIC OPERATIONS

Makes wide variety of cuts from hairline
width to abraded areas

With the Airbrasive process, cuts as fine as .005" are as easy to make as large abraded or "frosted" areas of several square inches. It is simply a matter of nozzle tip distance (NTD).

You will recall that the process involves directing a precisely controlled stream of sharp-edged, finely graded, abrasive particles at the work. A typical Airbrasive stream can be described as follows . . . with the standard .018" diameter nozzle, the stream is cylindrical for a short distance (approximately 1/16"). It then diverges into a cone-shaped spray with a total included angle of 7°, as shown in the diagram.

It can be seen that with close nozzle tip distances (NTD), small holes can be made with comparatively straight walls. As the nozzle is moved away from the work, the diameter of the hole or the width of the cut increases. At the same time the walls of the cut become more angular.

Flexibility of operation

Both straight and right-angle nozzles with various shapes and sizes of orifice are available to provide further flexibility of cutting (see pages 12 & 13). The right angle nozzles often enable the operator to make cuts in positions inaccessible to ordinary cutting tools.

For example, helixes have been cut in the interior of ceramic tubing having an inside diameter of 0.17".

The S. S. White Industrial Airbrasive is finding application both as a manual instrument and as an automated production tool. For many cleaning and frosting operations the handpiece is most advantageous. On the other hand, many production line operations, such as cutting a contact line on a potentiometer coil or making accurately positioned cuts in a semiconductor element, are best carried out by using the modified nozzle tip holder that is held in a fixture. Thus it can be positioned and operated automatically.

Manual



Automatic



TYPICAL CUTTING ACTION OF
.018" DIAMETER NOZZLE



Abrading and frosting. Excellent abrading results are obtained from the Airbrasive process, often quicker and cheaper than acid etching or grinding. In addition, there is the added factor of safety provided by the cool, *shockless* cutting action of the Airbrasive. The surface finish can be varied by the grade of Airbrasive powder used. No. 3 powder (50 microns) produces a finish similar to ground glass. No. 5 powder (10 microns) will produce an extremely smooth matte finish. No. 1 powder, a finish somewhere between No. 3 and No. 5. NTD for abrading or frosting is usually from 1 to 3 inches, with the tool held at an acute angle to the work.

Designs can be reproduced clearly and accurately with the Airbrasive when a mask of metal or rubber is used.

Cleaning. The Airbrasive opens up new possibilities for safe removal of metallic smears on ceramics, oxides on metals, resistive coatings, and so on—especially from parts too delicate to stand manual scraping or power grinding. Position and NTD of the Airbrasive nozzle depends largely on the work required. Naturally, to remove a small deposit or scribe a fine line, the nozzle should be held closer to the surface. On the other hand, many jobs are handled with the hand-piece held from ½ to 3 inches away.

Wire-stripping. The Airbrasive is proving highly successful in removing potting material from leads, potentiometer varnish, etc. Cutting a contact path on a potentiometer winding, for example, is 6 to 10 times faster with the Airbrasive than with any other method . . . leaving a cleaner, more accurate path! The windings, no matter how fine the wires, are unaffected. The process can be automated with a simple jig. NTD is a matter of how narrow you need the path to be. The Airbrasive powder usually used is No. 4.

Resistor adjustment. The Airbrasive can adjust with great precision both deposited and wire-wound resistors by accurate and controlled removal of conductive material. The process is easily automated. A more reliable resistor results because the Airbrasive adjustment is free of shock and heat.

Micromodule fabrication. When used with micromanipulation, the Airbrasive will change conductive paths, change resistance, shape ceramic elements, and eliminate danger of damage from sharp tools on delicate materials.

Semiconductors. All types of operations may be performed on semiconductor materials such as germanium, silicon, gallium, and others. Cutting, drilling, cleaning, dicing, beveling, thinning by Airbrasive is fast and accurate. Even thin, fragile sections can be processed with complete freedom from shock and heat. A high order of precision is obtainable with fixtures such as pantographs, micromanipulators, and masks.

Crystalline materials. Quartz, sapphire, mica, glass, and other crystalline structures can be cut and shaped with the Airbrasive. Patterns can be etched by using a mask or fixture.

Plastics. It is possible to make small adjustments with the Airbrasive in plastic molds after they have been given final hardening treatment. The tool is also useful for removing residual material from inaccessible parts of molds and to apply a matte finish where desired. It is much faster to remove flash with the Airbrasive from small molded parts, at parting lines and around molded-in pins than by hand methods. There is also less likelihood of damage to the part.

Deburring. Precision removal of fine burrs is becoming more and more important as quality standards are constantly rising in such fields as missile parts . . . medical equipment . . . computers. Many specifications call for microscopic examination of edges for objectionable burrs. The Airbrasive can remove these fine burrs faster and more completely than by hand filing methods and with less dimensional loss. Moreover the unit will often function exceptionally well in hard-to-get-at places such as the intersections of drilled or tapped holes. It will also remove burrs from external and internal threads. NTD and powder grade is usually a matter of experimentation.

Other metalworking applications of the Airbrasive include drilling and cutting thin sections of hardened metal, applying numbers or trade names of parts, removing chrome, anodized finish, corrosion, or contaminants from small areas, matte finishing, removing broken tool bits.

Testing abrasion resistance of various materials. Many research laboratories are using the Industrial Airbrasive to test the abrasion resistance of different materials. This alone is a testimonial to the accuracy and reliability of the unit. Once calibrated, the Airbrasive will hold its rate of abrasive flow, etc. within close limits. Thus, comparative tests of Airbrasive cutting of various surfaces will be an indication of the ability of those surfaces to resist abrasion.

Other research laboratory uses of the Airbrasive include: preparation of surfaces for strain gage application, creation of artificial flaws in materials for calibration of test equipment.

We shall be glad to accept your collect call for further information regarding the possible application of the Airbrasive Unit to the job you have in mind . . . or send us samples of the type of work you are considering, and we will make prompt trials and advise you on the result.

microelectronic modules trimmed. The resistor electrical value and trims the tolerance.

CUTTING SPEED

*Cutting speed or removal
of material is affected
by four factors:*

1. Nozzle tip distance (NTD). Cutting speed will increase up to a certain amount as the NTD increases. In glass for example, at a distance of approximately $\frac{1}{2}$ ", maximum material is removed. (See chart.) Note however, that at this distance the width of the cut is relatively wide and the NTD is more useful for removing broad areas of metallized film or coating. At closer NTD's, finer cuts with good definition are obtainable.

2. Airbrasive flow. The richness of the Airbrasive mixture is adjusted by the Feed Control Knob, which varies the voltage across the vibrator, giving a richer or leaner flow of abrasive. The voltmeter on the panel indicates the vibrator voltage.

Material removal rate will increase up to a certain amount as the Airbrasive flow increases. In the chart for glass, for example, maximum cutting speed occurs at a flow of approximately 10 grams per minute (corresponding to 70 volts impressed on a typical vibrator). Use of a minimum acceptable flow tends toward greater economy in powder and nozzle tips. Thus at a flow rate of 5 grams per minute a single charge of No. 1 Airbrasive powder would last about one hour of continuous use.

3. Pressure. The Industrial Airbrasive unit is designed to utilize the following sources of gas propellant: (1) Readily obtainable commercial cylinder gases, such as carbon dioxide or nitrogen (NEVER use oxygen).

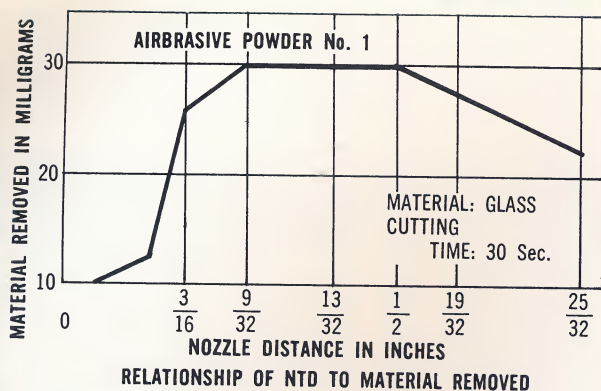
(2) An air compressor and filter especially adapted for the purpose, which is available from S. S. White.

(3) Under certain conditions, shop air that has been filtered by the S. S. White Automatic Air Filter-Drain.

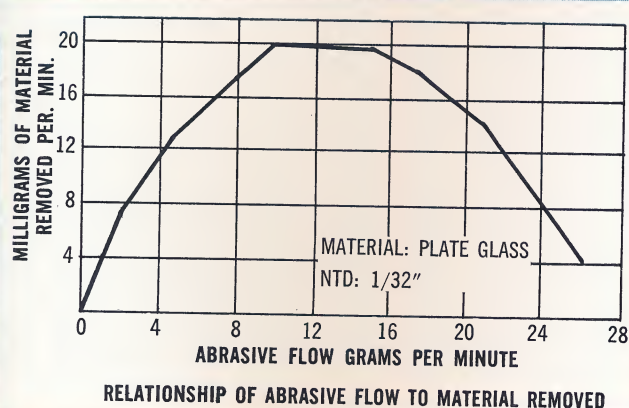
The Airbrasive Unit is set at the factory to maintain a steady 80 to 86 psi when the unit is connected to an adequate gas supply. This means that there will be a fixed pressure behind the nozzle of approximately 75 psi, which gives satisfactory operation for most cases. Higher pressures up to 125 psi can be used, but they will cause faster nozzle wear. Pressures lower than 80 psi can be used where a slower removal rate is desired. For special situations the gas pressure can be changed at the pressure regulator located on the gas cylinder.

4. Type of Airbrasive powder. Cutting speed is materially affected by the type of abrasive used. S. S. White has made available 5 types of Airbrasive powder to meet a wide variety of needs. These are finely classified for size, and are non-toxic. Thus they are free-flowing and have the right abrasive characteristics needed for Airbrasive cutting.

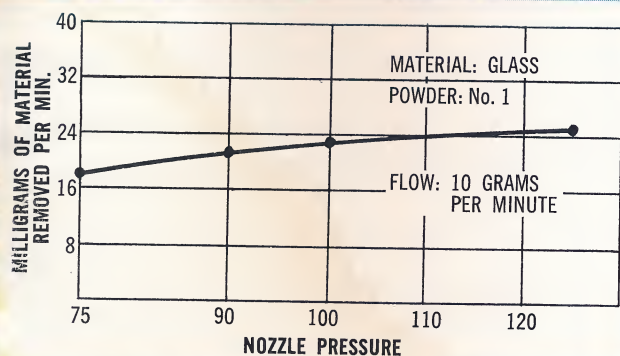
We do not recommend the use of standard commercial abrasive powders since they are rarely classified properly and may have toxic agents present.



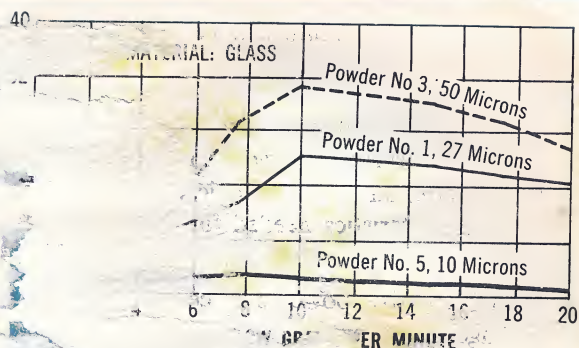
Factor **1.** How nozzle tip distance (NTD) affects cutting speed in glass.



Factor **2.** How rate of Airbrasive flow affects cutting speed in glass.



Factor **3.** How pressure affects the cutting speed in glass.



Airbrasive powders Nos. 7 and 8 cut at the same rate as powder No. 1. However, they have a higher hardness, and therefore they cut glass.

Relationship of Airbrasive Powder to Material Removed in Glass

Safe, efficient, low-cost operation. The Industrial Airbrasive is completely safe for operating personnel. No special precautions are necessary when using S. S. White Airbrasive powders, since they do not contain any toxic substances. Interestingly enough, if the Airbrasive stream should come in contact with the skin, it will do no harm.

In the interests of good housekeeping, a good dust removal system is recommended. If not available in the shop, the highly efficient Torit dust collector is available (see pages 16 & 17) through S. S. White, complete with hoods designed for the purpose.

Not only is the Industrial Airbrasive Unit low in initial cost, but it is also low in operating costs. We have seen how under average conditions a charge of No. 1 Airbrasive powder (11½ ozs.) will last about an hour. Nozzle life is good; an .018 nozzle, for example, will handle approximately 35 pounds of No. 1 Airbrasive powder before needing replacement. Air or gas consumption is low; at 75 psi average nozzle pressure, the unit uses approximately ⅓ of a cubic foot per minute. This means that a standard 425 cu. ft. CO₂ cylinder will last approximately 21 hours.

THE FOLLOWING AIRBRASIVE POWDERS ARE AVAILABLE FROM S. S. WHITE:

No. 1 For medium cutting—27 micron aluminum oxide

No. 2 Light cleaning and etching—classified dolomite (calcium magnesium carbonate) *

No. 3 For fast cutting—50 micron aluminum oxide

No. 4 Special for potentiometer manufacturers—sodium bicarbonate specially processed and packaged * **

No. 5 Very fine cutting and cleaning—10 micron aluminum oxide

No. 7 For cutting of extra hard materials—27 micron silicon carbide

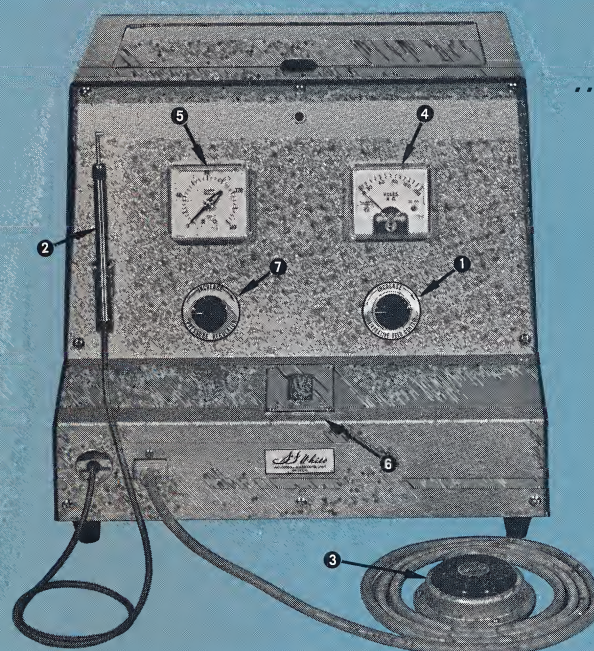
No. 8 Fastest cutting on extra hard materials—50 micron silicon carbide

*Airbrasive powders Nos. 2 and 4 are not suitable for use with rectangular nozzles.

**Airbrasive powder No. 4 is recommended for use only with commercial bottled gas.

S.S. WHITE INDUSTRIAL AIRBRASIVE UNITS

Two Models Available!



MODEL F
*...Single Jet
Unit*

S. S. WHITE INDUSTRIAL AIRBRASIVE UNIT MODEL F – Single Jet Unit

The Airbrasive Unit provides a controlled mixture of abrasive particles in an inert, dry gas stream and propels this mixture through a tungsten carbide nozzle at supersonic speed.

The Model F is a single nozzle unit. The Housing contains the mixing chamber and its vibrator and associated equipment, which provide the Airbrasive mixture. When the foot switch is closed, a solenoid is opened and allows gas to flow through the chamber. At the same time the vibrator is activated and vibration of the mixing chamber causes abrasive particles to fall into the gas stream at a precise rate.

A control knob on the front panel regulates the voltage impressed on the vibrator, thus controlling the rate of abrasive flow. A voltmeter indicates this voltage. A pressure gage indicates the gas pressure in the mixing chamber. This pressure can be regulated by a control on the front panel. Also externally located on the housing, are connections for the handpiece tubing, gas supply, 110 volt ac power, foot switch, blow-off tubing (to relieve pressure in the mixing chamber during reloading), and a master switch for the unit.

The *Model F* is an economical unit that provides a single cutting nozzle and mixing chamber. It is especially useful in the laboratory for experimental work and for low-volume production.

PRICE

\$650 complete

Order as
Part No. **351-6980Y**

Prices subject to change.

Specifications for Model F

The following are supplied with each Industrial Airbrasive Unit Model F

- 1 Handpiece with tubing
- 1 Foot switch and cord
- 1 Power supply cord and plug
- 1 Blow-off tubing
- 1 Connection and tubing for abrasive propellant
- 1 #351-1836X straight .018 in. ID nozzle tip
- 1 #351-1837X right-angle .018 in. ID nozzle tip
- 1 #351-1902X straight .006 x .060 in. rectangular nozzle tip

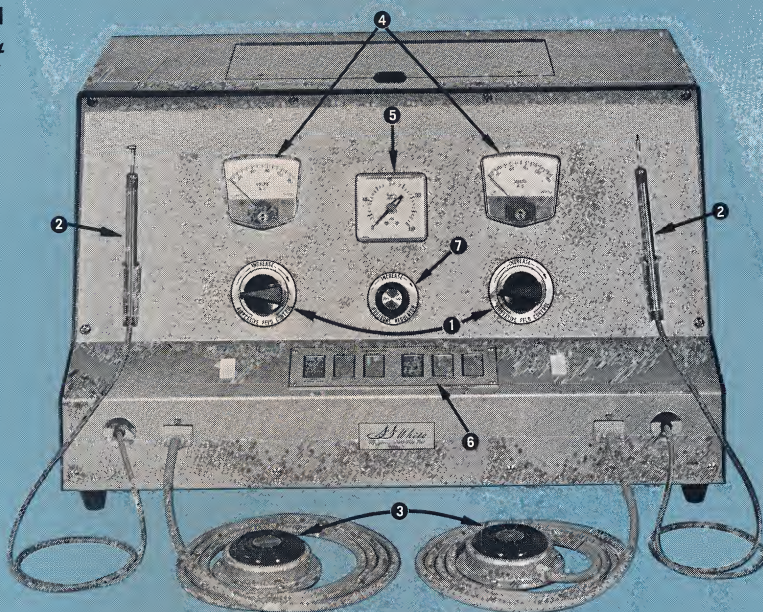
- 1 #351-800 funnel
- 1 No. 1 Airbrasive nozzle
- 1 No. 2 Airbrasive nozzle
- 1 No. 3 Airbrasive nozzle

Dimensions

Operating instructions

Operation on 110 volt, ac
plied for other voltages and

MODEL G ...Twin Jet Unit



- ① Airbrasive flow control
- ② Handpiece with nozzle and tubing
- ③ Foot switch
- ④ Voltmeter
- ⑤ Pressure gage
- ⑥ Control panel
- ⑦ Pressure regulator control

S. S. WHITE INDUSTRIAL AIRBRASIVE UNIT MODEL G – Twin Jet Unit

The Duplex Model G, with two separate nozzles and mixing chambers, is the most versatile, most efficient Airbrasive yet designed. Its new, improved control system makes operation of the unit simpler than ever before. The two nozzles can be used independently, each having its own control system and mixing chamber.

Easier to operate. The nozzles can be operated by foot switch or shifted to a steady flow merely by pressing a switch. A jet of air only—no abrasive—may be obtained, making cleaning parts or flushing the nozzle a simple, quick operation.

Easier to maintain. A blow-off switch relieves pressure in the chamber in a matter of seconds. The restyled cabinet and interior layout make it easier to gain access to the unit for maintenance. A complete operation and repair manual, with easy-to-follow drawings comes with the unit.

Work with shop air. The Model G unit contains the S. S. White automatic air filter, enabling it to be operated with shop air that is free of excessive moisture and contaminants. The automatic air filter is available as an accessory on other Airbrasive models.

- Uninterrupted operation with a single Airbrasive powder, by allowing one chamber to be refilled while the other is in operation.
- Independent operations with the same Airbrasive powder. This permits two operators to work independently or perform associated operations.
- Independent operations with two different grades of powder.
- Independent operations with different nozzle tips.

PRICE

\$1,240 complete

Order as
Part No. **351-5993Y**

Prices subject to change.

Specifications Model G The following are supplied with each Industrial Airbrasive Unit Model G:

- 1 No. 1 Airbrasive powder—4 lb. can
 - 1 No. 2 Airbrasive powder—3 lb. can
 - 1 No. 3 Airbrasive powder—4 lb. can
 - 1 Service kit and spare parts assortment. Operating instructions and service manual. Service kit contains tools useful for maintaining the unit. Spare parts are those most commonly called for.
- Dimensions: 22¼" x 14¼" x 13¾" Net Weight: 85 lb.
Operation on 110 volt, 60 cycle ac. Special units can be supplied for other voltages and cycles.

S.S. WHITE AIRBRASIVE NOZZLE TIPS

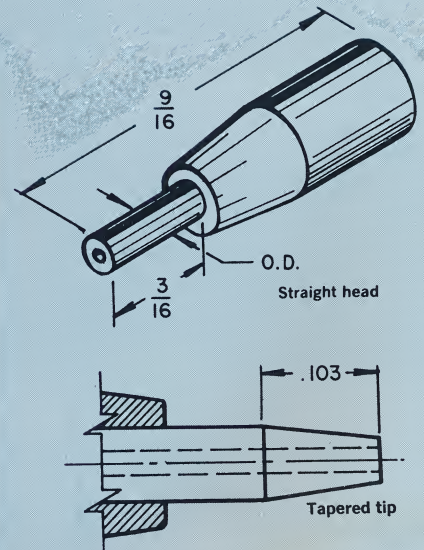
S.S. White offers on this page an expanded line of nozzle tips for use with industrial Airbrasive equipment. Many of these nozzles are new. All are available from stock.

Tungsten carbide nozzle tips give good service life, averaging 30 hours. However, we have for some time offered nozzles with synthetic sapphire tips (round orifices only). Tests and field experience show that the synthetic sapphire tips outlast tungsten carbide by a considerable margin, using S.S. White abrasives #1 through #5.

Abrasive particles rebounding from work may ricochet off nozzle tip

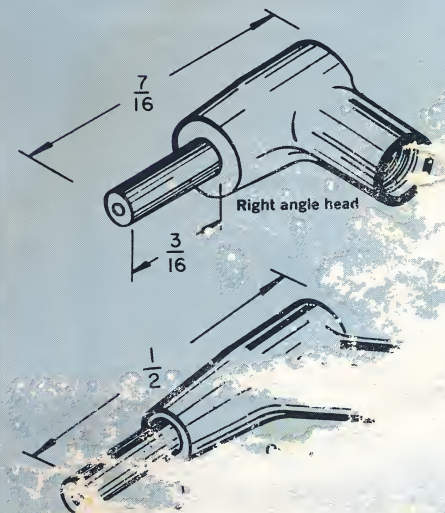
ROUND ORIFICE NOZZLES — STRAIGHT HEAD

PART NO.	ORIFICE	O.D.	TAPERED O.D. AT END	MATERIAL (TIP)	PRICE EACH
353-127x	.005	.035	.020	carbide	\$9.00**
351-1934x	.007	.035	not tapered	carbide	9.00**
351-1933x	.008	.090	.040	sapphire	60.00
351-1904x	.011	.052	.040	carbide	9.00**
351-1915x	.018	.035	not tapered	carbide	6.00*
351-1942x	.018	.052	.040	sapphire	35.00
351-1837x	.018	.052	not tapered	carbide	6.00*
351-1847x	.026	.076	not tapered	carbide	6.00*
353-153x	.026	.050	not tapered	sapphire	20.00
353-150x	.032	.070	.050	carbide	9.00**



ROUND ORIFICE NOZZLES — RIGHT ANGLE HEAD

PART NO.	ORIFICE	O.D.	TAPERED O.D. AT END	MATERIAL (TIP)	PRICE EACH
351-1935x	.007	.035	not tapered	carbide	9.00**
351-1936x	.008	.090	.040	sapphire	60.00
351-1926x	.011	.052	.040	carbide	9.00**
351-1836x	.018	.052	not tapered	carbide	6.00*
351-1914x	.018	.035	not tapered	carbide	6.00*
351-1944x	.018	.052	.040	sapphire	35.00
351-1846x	.026	.076	not tapered	carbide	6.00*
353-156x	.026	.050	not tapered	sapphire	20.00
353-158x	.032	.070	.050	carbide	9.00**



135° OBTUSE ANGLE HEAD

351-1839x	.018	.052	not tapered	carbide	6.00*
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NOTES: Nozzles with orifice of .011" or smaller recommended for use with #1 powder only.

and back onto work, causing some abrasion beyond the desired area. For very precise applications, S.S. White has developed the tapered nozzle tip which all but eliminates secondary ricochet, for a very precise path of abrasion.

The nozzles listed here meet the requirements of practically all Airbrasive applications. However, new applications are constantly being found, and accordingly, we have a continuing program of research and testing for new types and sizes of nozzles. If you have an application requiring a nozzle not listed here we will be glad to work with you to develop one which will meet your specific requirements.

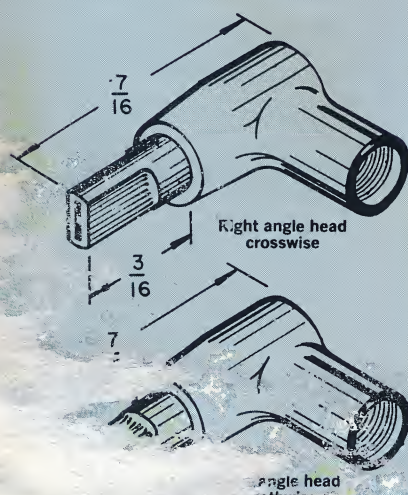
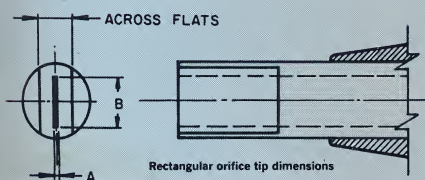
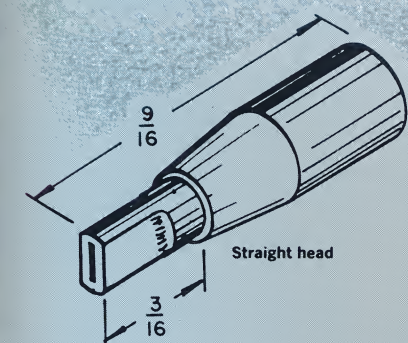
RECTANGULAR ORIFICE CARBIDE NOZZLES — STRAIGHT HEAD

PART NO.	ORIFICE		ACROSS FLATS	PRICE EACH
	A	B		
351-1937x	.003	.020	.029	9.00**
351-1903x	.003	.060	.046	9.00**
353-161x	.006	.020	.046	6.00*
351-1912x	.006	.040	.046	6.00*
351-1927x	.006	.060	.029	6.00*
351-1902x	.006	.060	.046	6.00*
353-128x	.006	.075	.046	9.00**
351-103x	.006	.100	.040	9.00**
353-125x	.007	.125	.040	9.00**
353-123x	.007	.150	.040	9.00**
353-164x	.010	.030	.046	9.00**
353-167x	.026	.026	.070	9.00**

RECTANGULAR ORIFICE CARBIDE NOZZLES — RIGHT ANGLE HEAD

PART NO.	ORIFICE		ACROSS FLATS AT TIP	POSITION OF ORIFICE	PRICE EACH
	A	B			
351-1938x	.003	.020	.029	lengthwise	9.00**
351-1925x	.003	.060	.046	crosswise	9.00**
353-170x	.006	.020	.046	crosswise	6.00*
351-1910x	.006	.040	.046	crosswise	9.00**
351-1911x	.006	.040	.046	lengthwise	9.00**
351-1928x	.006	.060	.029	crosswise	6.00*
351-1929x	.006	.060	.029	lengthwise	6.00*
351-1905x	.006	.060	.046	crosswise	6.00*
351-1901x	.006	.060	.046	lengthwise	6.00*
353-174x	.010	.030	.046	crosswise	9.00**
353-177x	.026	.026	.070	---	9.00**

NOTES: Nozzles with orifices .003" X .060" and .003" X .020" recommended for use with #1 powder only.



Right angle head

ABRASIVE POWDERS

No. 1 ALUMINUM OXIDE 27 MICRON	351-895Y — 4 lb. Can 1 to 23 Cans	ea. 5.00	24 Can Carton 107.00
	351-891Y — 30 lb. Can 1 to 15 Cans	ea. 30.00	16 or more Cans....ea. 27.00
	351-1589Y — 150 lb. Drum 1 to 5 Drums	ea. 100.00	6 or more Drums...ea. 90.00
No. 2 CALCIUM MAGNESIUM OXIDE (DOLOMITE)	351-897Y — 3 lb. Can 1 to 23 Cans	ea. 1.80	24 Can Carton 39.00
	351-892Y — 20 lb. Can	ea. 7.50	
	351-1588Y — 100 lb. Drum	ea. 20.00	
No. 3 ALUMINUM OXIDE 50 MICRON	351-1615Y — 4 lb. Can 1 to 23 Cans	ea. 5.00	24 Can Carton 107.00
	351-896Y — 10 lb. Can	ea. 10.00	
	351-1587Y — 100 lb. Drum 1 to 5 Drums	ea. 65.00	6 or more Drums...ea. 58.50
No. 4 SODIUM BICARBONATE	351-1622Y — 25 lb. Container (50—8 oz. bags)	ea. 15.00	
	351-1623Y — 100 lb. Drum (200—8 oz. bags) 1 to 5 Drums	ea. 54.00	6 or more Drums...ea. 48.60
No. 5 ALUMINUM OXIDE 10 MICRON	351-2091Y — 2 lb. Can	ea. 10.00	
	351-2090Y — 25 lb. Container 1 to 5 Containers	ea. 100.00	6 or more Containers ea. 90.00
No. 7 SILICON CARBIDE 25 MICRON	351-2096Y — 2 lb. Can	ea. 2.75	
	351-2097Y — 20 lb. Can	ea. 22.00	
No. 8 SILICON CARBIDE 50 MICRON	351-2098Y — 3 lb. Can	ea. 4.15	
	351-2099Y — 20 lb. Can	ea. 22.00	

ALL PRICES
QUOTED IN THIS
BROCHURE SUBJECT
TO THE
FOLLOWING:

TERMS: Net 30 Days
SHIPMENTS: F.O.B. Shipping Point
PRICES SUBJECT
TO CHANGE.

EXCEPT: Order
prices noted, price
includes handling charge.
U.S.A. This does not apply
To avoid handling charge, we
of orders for special requirements.

*Now . . . longer operating time
for your Airbrasive Unit*

AUXILIARY FEED CHAMBER KITS FOR INDUSTRIAL AIRBRASIVE® UNITS

- designed for mass-production
- easy to install
- fewer interruptions
- abrasive powder stays drier, cleaner
- steady flow rate over longer period
- greater powder economy

Now you can extend the usefulness of your S. S. White Industrial Airbrasive Unit. Auxiliary feed chambers for both Model F and Model G units are now available in a handy kit for quick installation.

Each auxiliary feed chamber adds four pounds of abrasive powder capacity to the unit's mixing chamber . . . a six-fold increase in capacity.

With the auxiliary feed chamber installed, your Airbrasive Unit can be operated far longer without interruption for refill. This is important to those who are using the Airbrasive on production lines and in automatic equipment.

When production schedules are tight, you can greatly reduce downtime required to refill the unit with powder. And you also greatly reduce the manpower required for this maintenance chore.

The auxiliary feed chamber offers another bonus in operation. The higher capacity reduces the possibility of moisture and foreign particles getting into the chamber during frequent refilling. This can occasionally cause some clogging of the powder that is undesirable in a production line. In addition, increased powder storage means longer period of operation, less waste.

Recommended for
powder.

S. S. WHITE

*Equipment
and Accessories*

MODEL "F" AUXILIARY FEED CHAMBER KIT

PRICE . . .
\$150 complete

Order as
Part No.
351-7600Y



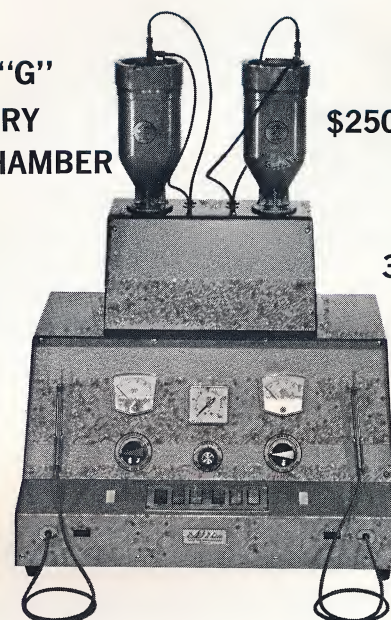
Requires only a couple of hours to install. It requires a height above the unit of 17 inches. It consists of one auxiliary chamber, cabinet, and necessary hoses and fittings to make the adaption. Complete instructions for installation are included.

When ordering, be sure to specify type of powder to be used in auxiliary chamber.

MODEL "G" AUXILIARY FEED CHAMBER KIT

PRICE . . .
\$250 complete

Order as
Part No.
351-7650Y



Comes complete with two auxiliary mixing chambers, cabinet, and all the necessary hoses, fittings and instructions necessary to adapt the Model "G" unit. Installation time is approximately two to three hours. Height required for the auxiliary chambers is 17 inches above the unit.

When ordering, be sure to specify type of powder to be used in auxiliary chamber.

Prices subject to change.

DUST COLLECTORS FOR S.S. WHITE INDUSTRIAL AIRBRASIVE UNIT

For a single work station

Model 66C Torit dust collector

with exhaust silencer and Airbrasive exhaust chamber, has adequate capacity to handle a single work station efficiently. Thus it is recommended for use with the Model F Airbrasive Unit, which is the single jet model, or with the Model G Twin Jet Airbrasive, when only one work station is operated.



Price ...\$397 complete

Prices subject to change.

Model 66C Torit

MOTOR— $\frac{1}{2}$ hp, 110 volt, 60 cycle, single phase.

RATING—370 cfm with clean filters.

EXHAUST SILENCER—lined with 1" thick plastic foam. Absorbs approximately 80% of the noise without restricting the air flow. Dimensions: 4 $\frac{1}{2}$ " wide by 9 $\frac{1}{2}$ " deep by 30" high.

CABINET—steel, baked-grey finish. Dimensions: 22" wide by 24" deep by 33" high.

AIRBRASIVE EXHAUST CHAMBER (1)—with one 3" dia., 4-foot duck-covered hose and two clamps. Chamber measures 24" wide by 14" deep by 16" high.

SHIPPING WEIGHT

REPLACEMENT PARTS

\$60.00

Torit Dust Collectors

A good dust collection system is recommended for the Airbrasive Unit for the sake of good housekeeping. If adequate dust removal is not available in the plant or laboratory, S. S. White makes available the following Torit dust collectors.

For two adjacent work stations
Model 75-80D Torit dust collector

with exhaust silencer and two Airbrasive exhaust chambers, is recommended for use with the Twin Jet Model G Airbrasive when two work stations are being operated. It is capable of moving approximately twice as much air as the Model 66C.



Price...\$597 complete

Prices subject to change.

Model 75-80D Torit

MOTOR—1 hp, 110 volt, 60 cycle, single phase.

RATING—700 cfm with clean filters.

AIRBRASIVE EXHAUST CHAMBERS (2)—with two 3" dia., 4-foot duck-covered hose and hose clamps. Chamber measures 24" wide by 12" deep by 16" high.

SHIPPING WEIGHT—400 pounds.

REPLACEMENT FILTERS—a complete set of replacement filters for the Model 75-80D is available at \$98.00 per set.

1/2" wide by

Height: 28"

PROPELLANT-GAS SUPPLY ACCESSORIES

*Propellant-gas
needed for the
operation of the
Airbrasive Unit
may be supplied
in any of the
following ways...*

1. **Commercial cylinder gas.** Readily available from your local supply house, commercial cylinder gas provides a dry, efficient, dependable source of propellant. Nitrogen or carbon dioxide or air, with one-stage regulator, usually supplied with the cylinder, are recommended. OXYGEN SHOULD NEVER BE USED.
2. **Bell & Gossett air compressor and S. S. White automatic air filter-drain**... we offer and recommend this equipment for use with the S. S. White Airbrasive Unit. Described below, the combination provides clean, dry air suitable for propelling all S. S. White Airbrasive powders, except No. 4. The use of any compressor without the S. S. White automatic air filter-drain is *not* recommended.
3. **Shop air and S. S. White automatic air filter-drain.** Shop air can be filtered by the S. S. White automatic air filter-drain for operation of the Airbrasive Unit with powders 1, 2, 3, and 5. *Excessive* moisture and contaminants should be removed from the shop air before passing through the automatic air filter-drain. Pressure should not exceed 150 psi. The automatic air filter-drain is an integral part of the Model G Airbrasive Unit.

Bell & Gossett Air Compressor SYCT-45-1

This oil-free compressor is mounted on a ten-gallon tank. Compressor delivers a sufficient volume of air for either the Model F or the Model G Airbrasive, and is capable of supplying four nozzles at 90 psi. With the S. S. White automatic air filter-drain in the line, the propellant air is sufficiently clean, oil- and moisture-free for use with the Airbrasive Unit. Compressor comes complete with pressure gage, shut-off valve on tank outlet, tank drain and tank safety valve.

Motor— $\frac{3}{4}$ hp, 115 volt, single-phase (other types available at additional cost).

Capacity—delivers 2.6 cfm free air at 80 psi. Switch cuts-in at 75 psig and cuts-out at 90 psig (can be adjusted).

Tank—10-gallon Non-Code air storage tank, tested to 150 pounds. Measures 13" by 24".

Dimensions—entire unit: 23 $\frac{1}{2}$ " high by 13" wide by 24" long

Shipping weight—85 pounds.

Price...\$227.75

S. S. White automatic air filter-drain

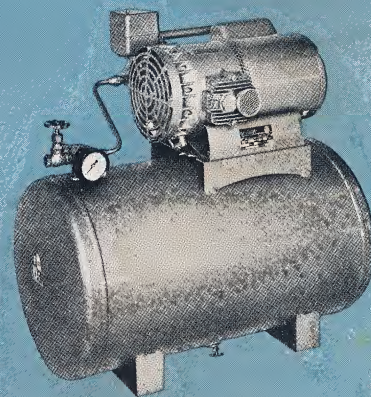
Efficient and trouble-free, the S. S. White automatic air filter-drain has exceptional filtering capacity. It is recommended for Airbrasive use with the Bell & Gossett air compressor or with shop air from which excessive moisture and contaminants have been removed.

Moisture discharge is automatic with the normal on-off operation of Airbrasive Unit. Whenever the Airbrasive is operated, accumulated moisture drains into the receiving cup at the bottom of the filter. Normally most of this moisture will evaporate into the atmosphere.

The automatic air filter-drain is readily attached to the Airbrasive at handle screws at the side of the unit. There are compression fittings on the filter for easy attachment of air hose, and fittings for attachment to the Bell & Gossett compressor.

Price—\$31.25

Prices subject to change.



SOME QUESTIONS AND ANSWERS ABOUT THE S. S. WHITE AIRBRASIVE UNIT

1. What is the narrowest cut that can be made?

Using the rectangular nozzle having an orifice of .003" x .060" at a nozzle tip distance of approximately 1/32", cuts approximately .005" wide can be made.

2. What abrasive is used?

Six Airbrasive Powders are available from S. S. White: No. 1 (27 microns in size); No. 3 (50 microns); No. 5 (10 microns). Nos. 1, 3, 5, are aluminum oxide. No. 2 is classified dolomite for light cleaning and etching; No. 4 is specially processed sodium bicarbonate for potentiometer manufacturers. No. 7 is 25 micron silicon carbide and No. 8 is 50 micron silicon carbide — for faster cutting on extra-hard materials.

3. Can other abrasives be used?

In general, no. Standard commercial grades of abrasive powders are not suitable because usually they are not classified close enough to have the proper flow or cutting characteristics for use in the Airbrasive equipment. Furthermore, they may contain free silica or other ingredients that may be deleterious to health.

4. Can the Airbrasive Powder be re-used?

No. The spent Airbrasive Powder loses its cutting points and edges, and would be very inefficient if re-used. More important, the recovered Airbrasive Powder may be contaminated and would clog the small orifices within the unit and nozzles. The Airbrasive Powder should never be re-used.

5. What is the capacity of the mixing chamber?

The mixing chamber will hold 11½ ozs. by weight of Airbrasive Powder No. 1. The use of the auxiliary feed chamber, which is available as an accessory, will give an additional four pounds of capacity of No. 1 powder.

6. How long will a single charge last?

This depends on the richness of the Airbrasive mixture. For example, at an average flow rate of 5 grams per minute, a charge of No. 1 powder in the unit's mixing chamber would last approximately 1 hour in continuous operation. Refilling the chamber takes about 1 minute. By adding an auxiliary feeding chamber, the unit operates for 5 or 6 hours before it is necessary to stop to refill the chamber.

7. What parts of the unit are most subject to wear?

The pinchcock in the shut-off valve and the nozzle of either of these parts is a sim-ilar situation.

8. What is the life of the nozzle?

Using one of the Airbrasive Powder at full pressure, the No. 1 round nozzle, either straight or right angle, will handle approximately 25 lbs. of abrasive before

requiring replacement. At lower pressures or with softer abrasives, nozzle life is greater.

9. What is the life of the rubber pinchcock?

This is dependent on the number of off-on operations of the unit. Tests have averaged 46,000 cycles while flowing 10 grams with an on-off cycle of 4 seconds.

10. What is the velocity of the Airbrasive stream?

The velocity of the stream, as it emerges from the nozzle, is believed to be approximately 1100 feet per second.

11. What are the sources of gas-propellant?

There are three normal sources of gas-propellant for the Airbrasive: (1) Commercially available cylinder gas — usually carbon dioxide or nitrogen. NEVER USE OXYGEN! (2) Compressed air from the Bell & Gossett air compressor combined with an S. S. White air filter-drain. (3) Shop air, under certain conditions (see page 18), can be filtered through the S. S. White air filter-drain for use with the unit. Ordinary shop air cannot be used without the filter, because it may be contaminated with moisture and oil, which interfere with the operation of the unit.

12. What is propellant consumption?

In normal operation at 75 psi nozzle pressure, the unit uses approximately 1/3 of a cubic foot per minute.

13. Do any special safety precautions have to be observed in the operation of the unit?

As far as operating personnel are concerned, no special precautions are necessary when using S. S. White Airbrasive Powders, which are non-toxic. As pointed out under question 3 above, other abrasives may contain free silica or other ingredients which would present a potential health hazard to the user. It might be further noted that accidental contact with the abrasive stream is not harmful to skin tissue. This we know is true of S. S. White Powders. It may also be true of some other abrasives.

14. What are the best masking materials and their relative merits?

Rubber — best life, poor definition.
Glass — best definition, poor life.
Copper — best all purpose.

15. What micro-inch finish will our various powders produce?

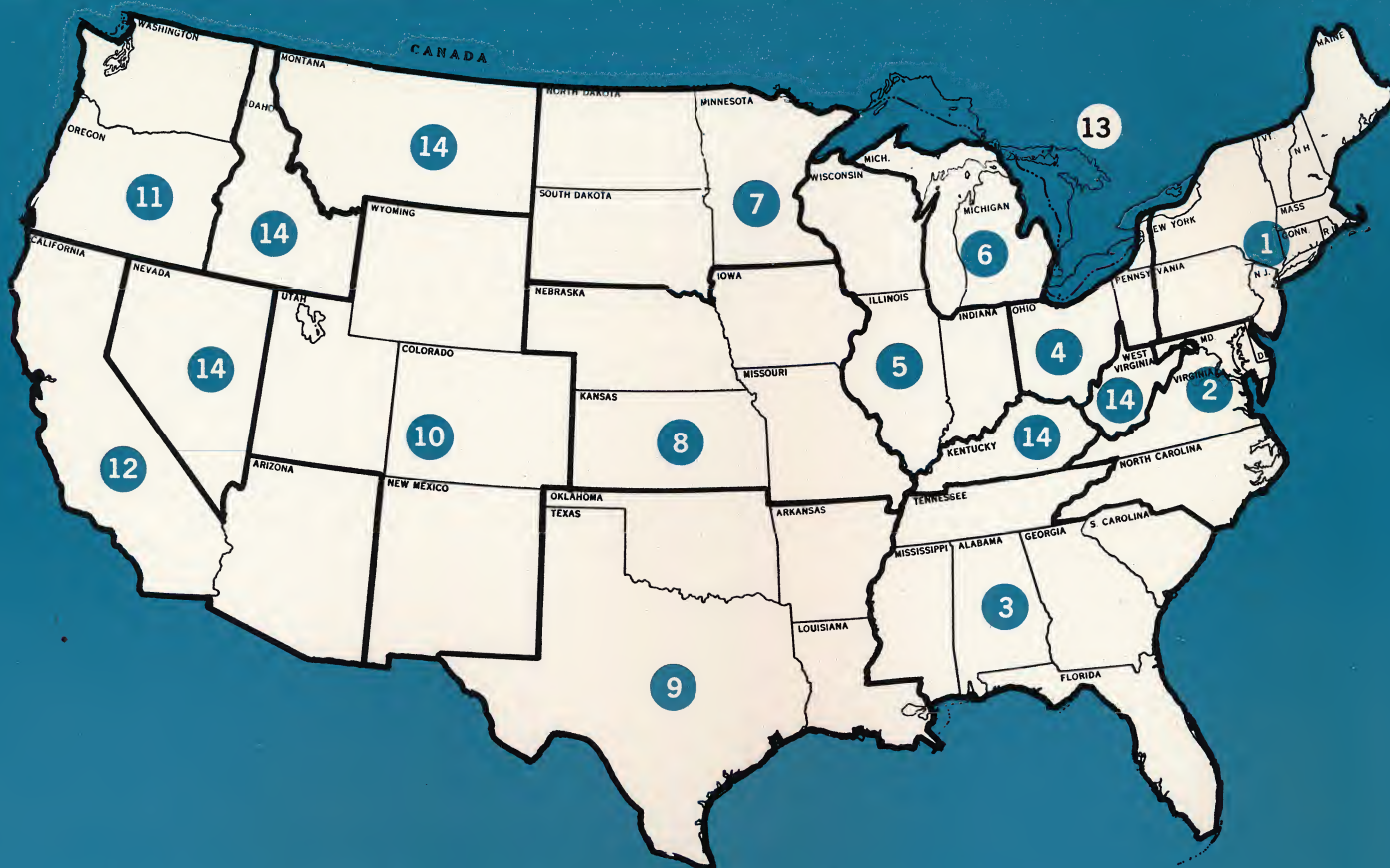
Starting with a near perfect surface, such as glass, our powders will produce the following micro-inch finishes:

No. 1 & No. 714 to 20 micro-inch
No. 3 & No. 838 to 55 micro-inch
No. 5 6 to 8 micro-inch

These figures were determined by Brush Instrument Co.'s Surf-Indicator.

16. What is the hardest material which can be cut by Airbrasive?

Diamond, provided sufficient pressure and a hard enough abrasive is used. One manufacturer has cut diamond using diamond dust as the abrasive, but actually silicon carbide can do the job, given enough time.



EXCLUSIVE SALES REPRESENTATIVES FOR INDUSTRIAL AIRBRASIVE EQUIPMENT

1 S. S. WHITE INDUSTRIAL DIVISION
201 East 42nd Street
New York, New York
212-661-3320

2 PRECISION SALES COMPANY
9301 Georgia Avenue
Silver Spring, Maryland
301-589-7690

PRECISION SALES COMPANY
104 Joppa Road
Baltimore, Maryland
301-828-4897

3 MURPHY & COTA
712 W. Vassar Avenue
Orlando, Florida
305-424-2167

MURPHY & COTA
904 Bob Wallace Avenue
Huntsville, Alabama
205-536-9121

4 ROBERT J. MILLER
5561 Stumph Road
Parma 30, Ohio
216-886-2358

5 F. W. STEWART CORP.
4311 N. Ravenswood Avenue
Chicago, Illinois
312-472-6600

6 JAMES P. ENNIS
105 Barrington Road
Bloomfield Hills, Michigan
313-335-9991

7 D. G. PERRY & CO.
5010 France Avenue South
Minneapolis, Minnesota 55410
612-920-3212

8 ENGINEERING SERVICES CO.
6717 Vernon Avenue
St. Louis, Missouri
314-726-2233

ENGINEERING SERVICES CO.
75-46 Troost Avenue
Kansas City, Missouri 64131
816-363-6000

ENGINEERING SERVICES CO.
1026 3rd Avenue Southeast
Cedar Rapids, Iowa
319-366-1591

9 TECHNO ASSOCIATES
2621 Manana Drive
Dallas 20, Texas
214-357-9213

10 CLINT HELTON & COMPANY
2442 South Downing St.
Denver, Colorado 80210
303-722-5751

11 LARRABEE & ASSOCIATES
2117 Second Avenue
Seattle, Washington 98121
206-682-2358

12 WEIGHTMAN & ASSOCIATES
1226 West Olive Avenue
Burbank, California
213-849-2435

WEIGHTMAN & ASSOCIATES
120 Santa Margarita
Menlo Park, California
415-325-2885

13 TUMBLING SALES & SERVICE LTD.
33 Glen Road
Hamilton, Ontario, Canada
JA 8-6979

14 NO REPRESENTATIVE (See #1)

INTERNATIONAL REPRESENTATIVES

S. S. White has established a network of sales outlets in many countries throughout the world. For further information contact the New York Office.



S.S. WHITE COMPANY
Industrial Division

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